

IN THE CLAIMS:

Please amend the following claims:

1 1. (Previously Presented) A process for the wet fractionation of cereal bran components,
2 wherein bran is first subjected to a combination of enzymatic treatment with enzymes of the
3 group starch- and phytate-hydrolysing enzymes, and aqueous wet milling, followed by an
4 optional step of enzyme inactivation by wet heat treatment, and a subsequent step whereby the
5 insoluble phase containing a cleaned bran consisting of both pericarp and aleurone fractions are
6 separated by centrifugal forces into an aqueous phase containing a germ-rich fraction and a
7 further aqueous phase containing residual endosperm components, and that the proteins
8 contained in the endosperm-rich fraction are concentrated.

1 2. (Previously Presented) A process according to claim 1, wherein cereal brans are the fibrous-
2 residue resulting from a primary grain milling, i.e. after the separation of the endosperm fraction,
3 of wheat, rice, barley, oat, rye and triticale, and having variable chemical compositions, presence
4 of anti-nutritive factors, and presence of various anatomical fractions, i.e. pericarp, germ, and
5 residual endosperm.

1 3. (Previously Presented) A process according to claim 1, wherein the enzymatic treatment is
2 accomplished using a starch degrading enzyme of the group of amylases and amyloglucosidases.

1 4. (Previously Presented) A process according to claim 1, wherein a further enzymatic
2 treatment is carried out using at least one non-starch degrading polysaccharidase in the form of

3 cellulases, hemicellulases mainly xylanases, beta-glucanases, and pectinases, and/or phytases.

1 5. (Previously Presented) A process for the wet fractionation of cereal bran substantially free of
2 soluble compounds produced according to claim 1, wherein such cleaned bran is subjected to a
3 combination of enzymatic treatment with specific enzymes of the group xylanase and/or beta-
4 glucanase under strictly controlled hydrolysis conditions, and intermittent wet milling, followed
5 by an optional step of enzyme inactivation by wet heat treatment.

1 6. (Previously Presented) A process according to claim 5, wherein the inactivated hydrolysate is
2 then fractionated by centrifugal forces into an insoluble phase containing primarily cellulose,
3 'lignin, less accessible hemicellulose, residual aleurone cells and cell wall bound proteins, and an
4 aqueous phase containing soluble hemicellulose, oligosaccharides, sugars and proteins, and that
5 the aqueous phase is further separated by centrifugal force into protein-rich fraction and a
6 carbohydrate-rich fraction, and that the carbohydrate-rich fraction is further separated by size
7 exclusion technique into a hemicellulose-rich fraction (medium molecular size fraction) and an
8 oligosaccharide-rich fraction (small molecular size fraction).

1 7. (Previously Presented) A process according to claim 5, wherein cereal bran substantially free
2 of both in water or less polar solvents soluble compounds are derived from wheat, rice, barley,
3 oat, rye or triticale.

1 8. (Previously Presented) A process according to claim 1, wherein the combination of
2 intermittent wet milling with enzymatic treatment is arranged to increase the rate of enzymatic

3 hydrolysis of the substrate thereby improving the overall hydrolysis performance and the
4 subsequent separation of the various fractions by density/solubility and molecular size.

1 9. (Previously Presented) A process according to claim 5, wherein the enzymatic treatment is
2 carried out using at least one non-starch degradable polysaccharidase in the form of cellulases,
3 hemicellulases mainly xylanases, beta-glucanases, and pectinases, and optionally phytases.

1 10. (Previously Presented) A process according to claim 9, wherein the enzymatic treatment is
2 accomplished by using xylanases with high beta 1-4- xylanase (pentosanase) and/or beta-
3 glucanase activity.

1 11. (Previously Presented) A protein fraction derived substantially from the germ and produced
2 according to claim 1, wherein the said fraction contains at least 35% protein and 10% oil on dry
3 matter basis and exhibits a high emulsifying capacity and an increased shelf life with regards to
4 resistance to oxidation compared to the original bran, and that the said fraction contains less than
5 5% fibre.

1 12. (Previously Presented) A protein fraction derived substantially from the residual endosperm
2 and produced according to claim 1, wherein the said fraction contains at least 25% protein and
3 10% sugar and less than 3% oil and 3% fibre, and at least 25% soluble high-molecular weight
4 non-starch polysaccharides of the groups beta-glucans for barley and oat and arabinoxylans for
5 wheat, rice, rye and triticale.

1 13. (Previously Presented) A protein fraction according to claim 12, wherein liquid whey is
2 incorporated in to the said fraction at levels varying from 20 to 80% by weight on dry matter
3 basis, and that the final mixture is dried.

1 14. (Previously Presented) An insoluble fibre fraction produced according to claim 1, wherein
2 the said fraction consists of cell wall components of bran in an amount of at least 85% and
3 aleurone proteins in an amount of at least 10%, and substantially free of gluten and starch, and
4 with a high water holding capacity of at least 6g water/g dry product.

1 15. (Previously Presented) A sugar fraction produced according to claim 1, wherein the said
2 fraction is originated primarily from the residual endosperm and it contains more than 65%
3 sugars, such as glucose, maltose and malto-triose on dry matter basis.

1 16. (Previously Presented) A protein fraction derived substantially from the aleurone cells and
2 produced according to claim 5, wherein the said fraction contains at least 35% protein and 10%
3 oil, less than 5% insoluble fibre on dry matter basis, substantially free of gluten and starch and
4 with a high emulsifying capacity.

1 17. (Previously Presented) An insoluble fibre fraction produced according to ~~[claims 5-10]~~
2 claim 5, wherein the said fraction consists primarily of cell wall components with a relative
3 lower hemicellulose content compared to the original cleaned cereal bran, substantially free of
4 gluten and starch (<1% on dry matter basis) and with a high water holding capacity (>6g water/g
5 dry product).

1 18. (Previously Presented) A soluble hemicellulose fraction produced according to claim 5,
2 wherein the said fraction consists primarily of medium molecular weight hemicellulose
3 preferably above 20kDa in an amount of at least 40% of the groups arabinoxylans from wheat,
4 rye, rice and triticale, and beta-glucans from oat and barley, which also contains proteins in an
5 amount of less than 10% and monosaccharides in an amount of less than 10%, and is
6 substantially free of gluten and starch in an amount of less than 1% on dry matter basis.

1 19. (Previously Presented) A soluble oligosaccharide fraction produced according to claim 5,
2 wherein the said fraction consists primarily of low molecular weight hemicellulose sub-units of
3 below about 20kDa in an amount of at least 40% of the groups arabinoxylans from wheat, rye,
4 rice and triticale, and beta-glucans from oat and barley, which also contains proteins in an
5 amount of less than 10%, monosaccharides in an amount of less than 20%, lignans and related
6 phenolics in an amount of less than 5%, and is substantially free of gluten and starch in an
7 amount of less than 1% on dry matter basis.

1 20. (Previously Presented) A protein fraction according to claim 11, wherein the oil can be
2 optionally removed by conventional organic solvent extraction or preferably by supercritical
3 carbon dioxide extraction to yield an oil fraction and a defatted protein fraction.

1 21. (Previously Presented) A protein fraction according to claim 16, wherein the oil can be
2 optionally removed by conventional organic solvent extraction or preferably by supercritical
3 carbon dioxide extraction to yield an oil fraction and a defatted protein fraction.

- 1 22. (Previously Presented) An insoluble dietary fibre according to claim 14, used for recovery
2 of cellulose, hemicellulose, lignin and lignans.
- 1 23. (Previously Presented) A germ oil produced in accordance with claim 1 containing sterols
2 known to reduce the uptake of cholesterol in humans and intact vitamin E complex, sterols,
3 lecithins, phospholipids and glycolipids.
- 1 24. (Previously Presented) A defatted germ rich protein produced in accordance with claim 1.
- 1 25. (Previously Presented) An aleurone-rich oil produced in accordance with claim 1.
- 1 26. (Previously Presented) A defatted aleurone-rich protein produced in accordance with claim
2 1.
- 1 27. (Previously Presented) A protein fraction according to claim 11, wherein proteases are
2 incorporated in to the said fraction in wet state and at controlled temperature and pH conditions,
3 and the resulting protein hydrolysate has enhanced functionalities such as solubility, emulsifying
4 and foaming capacities.
- 1 28. (Currently Amended) ~~The use of a protein fraction, as described in claim 11, in~~ In feed and
2 food applications ~~to replace~~ a protein fraction according to claim 11 such that other protein
3 products from vegetable and animal sources are replaced.

1 29. (Previously Presented) The use of a protein fraction, as described in claim 11, in food
2 application as a texturizer, emulsifier, fat binder and fat replacer.

1 30. (Previously Presented) The use of a protein fraction, as described in claim 12, as a raw
2 material for the extraction of soluble high-molecular weight non-starch polysaccharides.

1 31. (Previously Presented) The use of a protein fraction, as described in claim 12, in food
2 applications as a foam stabilising agent, whipping agent, water binder, gelling agent, and as a
3 dietary supplement rich in soluble dietary fibre (beta-glucans and arabinoxylans) with associated
4 health benefits such as cholesterol-reducing effects of the beta-glucans.

1 32. (Previously Presented) The use of a protein fraction, as described in claim 12, as an additive
2 or ingredient in foods such as baked products, processed meats, dairy products, soups and sauces,
3 high protein drinks and health drinks.

1 33. (Previously Presented) The use of a fibre fraction, as described in claim 14, in feed and food
2 applications to replace other insoluble fibrous products as a texturizing and water binding
3 additive in processed foods particularly meat products, and as a source of dietary fibre in
4 breakfast cereals, baked products and health products, or as a raw material for further processing
5 to extract remaining cellulose, hemicellulose, lignin and lignans.

1 34. (Previously Presented) The use of a soluble hemiceliulose, as described in claim 18, in feed

2 and food applications as a gellant, thickener, foam stabilizer, emulsifier, water binder, and as a
3 dietary supplement rich in soluble dietary fibre, and in chemical applications, or as a raw
4 material for further processing to obtain other functional hemicelluloses.

1 35. (Previously Presented) The use of a soluble hemicellulose, as described in claim 18, as an
2 additive or ingredient in foods such as baked products, processed meats, dairy products, soups
3 and sauces, high protein drinks and health drinks.

1 36. (Previously Presented) The use of a soluble oligosaccharide, as described in claim 19, in
2 feed and food applications as a functional soluble dietary fibre or low calorie sweetener, or as a
3 raw material for further processing to extract lignans and associated phenolics such as ferulic
4 acid, or as a feedstock for industrial fermentation.

1 37. (Previously Presented) The use of a soluble oligosaccharide, as described in claim 19, in
2 confectionery formulations in combination with glucose or other sugar syrups and further
3 concentrated to produce moisture stable products.

1 38. (Previously Presented) The use of a soluble oligosaccharide, as described in claim 19, in
2 food and biomedical applications as a combined source of lignans and fermentable
3 oligosaccharides for the conversion of lignans into active cancer-reducing agents such as
4 enterolactones.

1 39. (Previously Presented) The use of a sugar fraction, as described in claim 15, in .feed, food

2 and industrial fermentation applications as an energy source, flavouring agent and binding agent.

1 40. (Withdrawn) A set up for carrying out the process according to claim 1, wherein it
2 comprises a hydrolysis vessel, a wet mill, a heat exchange for enzymatic inactivation, decanters,
3 a holding tank, an ultra-filter, and optionally at least an evaporator, and dryers.

1 41. (Withdrawn) A set up for carrying out the process according to claim 5, wherein it
2 comprises a hydrolysis vessels, a wet mill, a heat exchange for enzymatic inactivation, decanters,
3 a holding tank, an ultra-filter, and optionally evaporators, and dryers.

1 42. (Previously Presented) A process according to claim 1, wherein the enzymatic treatment is
2 carried out for less than 3 hours at a pH of 4 to 7.5 and at a temperature of from 50 to 90°C, at an
3 enzymatic activity of at least 1 IU/g of substrate, preferably 200 to 1500 IU/g of substrate.

1 43. (Previously Presented) A process according to claim 5, wherein the enzymatic treatment is
2 carried out for less than 3 hours at a pH of 4 to 7, preferably 4.5-5.5, and at a temperature of
3 from 35 to 80°C, at an enzymatic activity of at least 1 IU/g of substrate, preferably 200 to 1500
4 IU/g of substrate.